

## 8 Selecting a Preferred Remedial Alternative

The purpose of the feasibility study as stated in WAC 173-340-350 (8)(a) “is to develop and evaluate cleanup action alternatives to enable a cleanup action to be selected for the site.” This section of the FS/EIS follows the requirements for selecting cleanup actions. It summarizes how each alternative complies with MTCA’s minimum requirements (WAC 173-340-360(2)(a)) and it illustrates how each remedial alternative is consistent with MTCA’s “other requirements” (WAC 173-340-360(2)(b)). This section also provides a comparison of the significant adverse environmental impacts and reasonable mitigation measures of the alternatives, consistent with SEPA.

### 8.1 Threshold Requirements

All cleanup actions shall fulfill the “threshold requirements” as specified in WAC 173-340-360(2)(a). This section describes how all the remedial alternatives presented in the FS/EIS meet these threshold requirements.

#### 8.1.1 Protect Human Health and the Environment

Cleanup levels that protect human health and the environment are provided in Section 5. Protection can be achieved by excavating all contaminated soil and sediments and attaining these cleanup levels throughout the site, as described in alternative STD, or by containing contaminated soil and groundwater and using institutional controls to minimize long-term exposure. The use of containment and institutional controls is acceptable under MTCA (WAC 173-340-360(2)(e)) as long as the cleanup action meets threshold and other requirements, the institutional controls reduce risk, and the cleanup action does not “rely primarily on institutional controls where it is technically practicable to implement a more permanent cleanup action.” At a minimum, each alternative (other than No Action) will remove free product, eliminate discharges of petroleum to surface water, and remove contaminated surface soil.

##### 8.1.1.1 Human Health

Section 5 demonstrates that the risks to human health under existing conditions at the site are the following:

- Direct contact with soil containing concentrations of TPH (based on the sum of EPH/VPH data) greater than 2,130 mg/kg in the vadose zone and 2,765 mg/kg in the smear zone, arsenic above 20 mg/kg, and lead above 250 mg/kg. These numeric criteria are based on a child ingesting 200 grams of soil per day for 6 years.

- The ingestion of groundwater or surface water and aquatic organisms for water containing greater than 477 µg/L TPH (based on the sum of EPH/VPH).

In order to eliminate these risks, each alternative addresses metal impacts in surface soil. The No Action alternative includes the continued application of Soil Sement™ while all of the other alternatives include the excavation and capping of all surface metals in soil in both the NW Developed and Railyard Zones. All other soil impacts are not present in surface soil and, therefore, require some form of excavation before there is human exposure. The soil TPH concentration to protect a construction worker, utility worker, or resident conducting occasional soil excavation from exposure is >100,000 mg/kg TPH (based on the sum of EPH/VPH), a concentration that has not been exceeded in any soil samples analyzed for EPH/VPH, including samples collected from free product areas. These intermittent exposures can be controlled by institutional controls such as a city-managed grading permit process that includes environmental review to ensure direct contact exposures to subsurface soil are avoided and contaminated soil and groundwater are safely managed. Alternatives SW3 and PB1 include excavation of accessible free product in the NW Developed Zone and alternatives SW4, PB2, PB3, PB4, and STD include the complete removal of free product from the NW Developed Zone. These alternatives provide more permanent means of protecting residents and utility or construction workers from being accidentally exposed to soil that presents a risk while working in yards or public rights-of-way. Remedial alternatives SW4, PB3, and PB4 include an additional layer of permanence and protectiveness by excavating subsurface soil impacts to satisfy the cleanup levels wherever soil contamination is within 4 feet of the ground surface.

The community currently has a public drinking water supply that is not at risk of contamination from the site. State and local institutional controls prohibit installation of wells within contaminated areas. These include the King County Board of Public Health, *Public Water System Rules and Regulations* (Title 12) and the *Declaration of Covenant for Individual Water Supply*, both managed by the Department of Health; Town of Skykomish Ordinance; and Department of Ecology *Minimum Standards for Construction and Maintenance of Wells*, WAC 173-160. Even though human health risk related to groundwater is already controlled by the existing water supply system and institutional controls, MTCA generally requires that groundwater be cleaned-up to drinking water standards.

Human health cleanup levels for groundwater and surface water are based on restoring the water for use as drinking water. Off-railyard exceedances of the 477-µg/L groundwater cleanup level are concurrent with free product (see Figure 3-9). Alternatives SW4, PB2, and PB3 aggressively address all free

product in all off-railyard areas and achieve the groundwater cleanup level in all off-railyard areas in a relatively short timeframe (<10 years). Alternatives SW3 and PB1 also address free product and achieve the groundwater cleanup level over a longer timeframe (<30 years) in off-railyard areas, but in a manner than creates less disturbance to the community.

#### **8.1.1.2 Environment**

Section 5 demonstrates that risks to the environment under existing conditions at the site are the following:

- Sediment in the Skykomish River that failed bioassay tests due to the presence of product seeps.
- Groundwater discharging to the Skykomish River and the Former Maloney Creek channel that may cause sediment to accumulate contaminants to levels that would present a risk to aquatic receptors. A groundwater TPH cleanup level of 64 µg/L (sum of EPH/VPH) was developed using conservative assumptions related to groundwater-sediment interaction.
- Groundwater discharging to the surface water of the Skykomish River and the Former Maloney Creek channel that would present a risk to aquatic receptors. A groundwater TPH cleanup level of 700 µg/L (sum of EPH/VPH) was developed based on WET testing bioassays on water column organisms.

Each alternative (other than No Action) provides groundwater treatment at the levee to treat groundwater to acceptable levels prior to discharge to the Skykomish River. More aggressive remedies, including free product or soil removal at the levee, are proposed for six of the nine remedial alternatives. With respect to the former Maloney Creek channel, it is not clear that groundwater above cleanup levels is discharging into the channel, although it may be inferred from the data. Aggressive cleanup is proposed for all alternatives for the South Developed Zone, which is immediately upgradient of the former Maloney Creek channel and would be a source of groundwater that may discharge to the channel during certain times of the year. In addition, active groundwater treatment within the former Maloney Creek channel is proposed for alternatives SW4, PB3, and PB4.

Based on bioassays, some sediment in the Skykomish River has been identified for cleanup. In addition, a correlation of the bioassay results with TPH concentrations produces a numeric cleanup level of 100 mg/kg NWTPH-Dx. Some sediment in the former Maloney Creek channel has also been identified for cleanup based on this cleanup level. Six of the nine remedial alternatives include actively addressing these sediment impacts in the

Skykomish River while four of the nine alternatives include actively addressing sediment impacts in the former Maloney Creek channel. Less aggressive approaches are included for other alternatives in an effort to avoid or minimize significant adverse environmental impacts that may outweigh the benefits of excavating sediments.

### **8.1.2 Comply With Cleanup Standards**

Cleanup standards consist of both a cleanup level and a point of compliance where the cleanup level must be met (WAC 173-340-700). Per the regulation, “a cleanup level is the concentration of a hazardous substance in soil, water, air, or sediment that is determined to be protective of human health and the environment under specified exposure conditions.” For each alternative presented in this FS/EIS, standard points of compliance are used for all media except groundwater. Cleanup standards applicable to groundwater at the site include:

- For all SW alternatives, groundwater must achieve a cleanup level of 64 µg/L TPH (sum of EPH/VPH) prior to discharging to surface water (Skykomish River and Former Maloney Creek channel).
- For all PB alternatives, groundwater must achieve a cleanup level of 477 µg/L TPH (sum of EPH/VPH) in all areas of town, except the railyard, and a cleanup level of 64 µg/L TPH (sum of EPH/VPH) prior to discharging to the Skykomish River and the Former Maloney Creek channel.
- For the STD alternative, groundwater must achieve a cleanup level of 64 µg/L TPH (sum of EPH/VPH) throughout the site.

Only remedial alternative STD can achieve groundwater cleanup levels at the standard point of compliance (i.e., throughout the site, including the railyard and off-railyard properties). STD is considered a permanent groundwater cleanup action. Per WAC 173-340-360(2)(c)(ii), the less permanent groundwater cleanup actions shall include “removal [of] free product consisting of petroleum and other light nonaqueous phase liquid (LNAPL) from the groundwater using normally accepted engineering practices” and “[g]round water containment...to the maximum extent practicable to avoid lateral and vertical expansion of the ground water volume affected by the hazardous substance.” All of the SW and PB alternatives address these requirements through the use of barrier walls, skimming pumps, or recovery trenches, all of which are normal engineering practice for removing heavy, viscous free product. More aggressive approaches have been included such as excavation near higher risk areas and nonstandard approaches such as ozone sparging and surfactant/thermal flushing are being considered. Enhanced bioremediation can effectively remove the diesel-range free product from the

NE Developed Zone. Monitored natural attenuation is proposed in some areas to avoid or minimize significant adverse effects on the built and natural environment.

STD achieves all groundwater, soil, surface water and sediment cleanup levels at the standard points of compliance. It is, therefore, the most permanent alternative considered in this FS/EIS. Institutional controls are required to ensure compliance with cleanup standards and must be implemented in accordance with WAC 173-340-440. For the STD alternative, institutional controls are required in the short-term (<8 years) to minimize the risk of exposure while the remedy is being implemented. For all of the other alternatives (PB and SW), long-term (10+ years) institutional controls are required to comply with cleanup standards. Institutional controls include restrictive covenants on individual properties and legal or administrative mechanisms. Restrictive covenants require the consent of the property owner of the property with contamination above cleanup levels to which the restrictive covenant is applied. Legal or administrative mechanisms include “zoning overlays, placing notices in local building department records or state lands records, public notices and education mailings.” State and local institutional controls already in place prohibit installation of wells within contaminated areas. Additional institutional controls (ordinances and private agreements) can further limit exposure and provide a mechanism for BNSF (or the Town with technical and financial assistance from BNSF) to safely manage contaminated soil and water encountered during construction activities on private and public properties. Any of these institutional controls could be removed or modified once the cleanup is completed.

All of the proposed remedial alternatives comply with cleanup standards. Compliance with cleanup standards would be demonstrated by monitoring during implementation of the cleanup action and over the long-term.

### **8.1.3 Comply With Applicable Local, State and Federal Laws**

Several applicable local, state and federal laws have been incorporated into the cleanup level development process included in this FS/EIS. These include the Sediment Management Standards (WAC 173-204) and the State Environmental Policy Act (WAC 197-11-400). Additional laws may apply to implementation of the cleanup action. An example is Section 404 of the Clean Water Act that will require permitting and mitigation associated with cleanup actions that impact the Skykomish River or the wetland at the former Maloney Creek channel. All of the alternatives included in the FS/EIS can be designed to comply with applicable local, state and federal laws.

### **8.1.4 Provide for Compliance Monitoring**

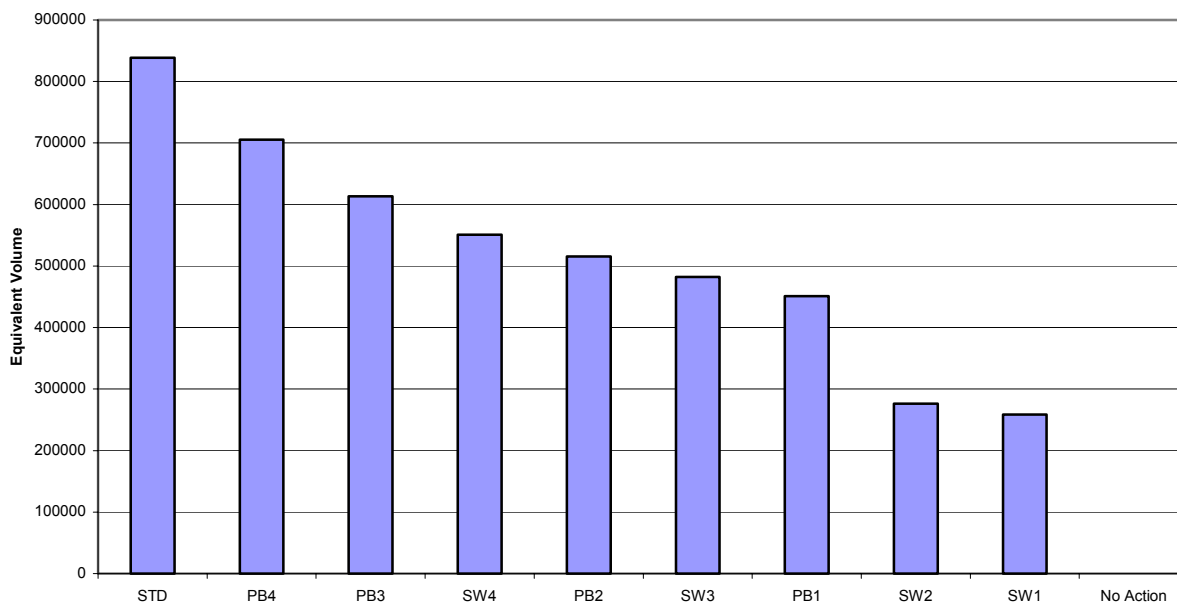
Compliance monitoring is not a cleanup element that is described in detail during the FS/EIS process. These provisions are better developed in the Cleanup Action Plan and detailed Compliance Monitoring Plans are developed during Engineering Design of the cleanup action. Compliance Monitoring Plans provide for a monitoring program to ensure that cleanup levels are obtained and include provisions for contingent remedies should the initial remedy fail. All of the alternatives in the FS/EIS can be designed to provide all phases of compliance monitoring, including protection, performance and conformational monitoring.

## **8.2 Use Permanent Solutions to the Maximum Extent Practicable**

The first of three “other requirements” for selection of cleanup actions under MTCA is the use of permanent solutions to the maximum extent practicable. The procedure for determining whether a cleanup action uses permanent solutions to the maximum extent practicable is provided in WAC 173-340-360(3). This section presents a “disproportionate cost analysis” to compare the relative costs and benefits of all the alternatives. Costs are disproportional to benefits if the incremental cost of an alternative exceeds the incremental benefit achieved with the additional cost. The analysis may be quantitative or qualitative. The analysis begins by ranking alternatives from the most permanent to the least permanent. Once alternatives are ranked from the most permanent to the least permanent, they are evaluated based on seven criteria in WAC 173-340-360(f).

A “permanent cleanup action” achieves cleanup standards without further action at the site, such as long-term monitoring, maintenance or institutional controls (WAC 173-340-200). Section 7.1.2.1 describes a process for quantifying permanence. The measure was termed “equivalent soil volume.” An alternative that treats or removes a greater equivalent soil volume may be considered more permanent because it represents a larger reduction in the volume of hazardous substances at the site and a reduced need for long-term monitoring, maintenance or institutional controls. The remedial alternatives are ranked in Figure 8-1 from the most permanent (STD) to the least permanent (No Action).

Figure 8-1 Remedial Alternatives Ranked By Permanence



## 8.2.1 Protectiveness

Protectiveness of human health and the environment includes the degree to which existing risks are reduced, time required to reduce risk at the site and attain cleanup standards, on-site and off-site risks resulting from implementing the alternative, and improvement of the overall environmental quality.

As discussed in Section 8.1.1.1, all of the remedial alternatives are designed to aggressively address possible human health risk associated with exposure to impacted surface soil. With respect to subsurface soil, alternatives SW4, PB3, and PB4 provide some additional protectiveness from dermal contact relative to the other alternatives by removing all impacts from within 4 feet of ground surface. While human health risk associated with consumption of groundwater is already controlled, alternatives SW3, SW4, PB1, PB2, and PB3 all aggressively address free product in the NW Developed Zone which are the only off-railyard areas that exceed the human health groundwater cleanup level of 477 µg/L outside of the NE Developed Zone (diesel impacts). 2A-W-6 has a TPH (sum of EPH/VPH) in excess of the criteria but is just outside the free product plume in the NE Developed Zone; however, this area will be addressed via enhanced bioremediation for the same alternatives listed above (SW3, SW4, PB1, PB2, PB3).

Alternatives SW4, PB3, and PB4 provide the greatest level of environmental protectiveness by addressing soil and sediment in the Former Maloney Creek channel and by addressing soil, sediment, and free product at the Levee. SW3 and PB2 provide a moderate level of environmental protectiveness by actively addressing sediment and free product at the Levee. SW1, SW2, and PB1 all provide a lower level of environmental protectiveness.

## 8.2.2 Permanence

Permanence was discussed earlier and the relative permanence of the remedial alternatives was illustrated in Figure 8-1.

## 8.2.3 Cost

Costs for each remedial alternative were developed as part of the FS process. Figure 8-2 indicates the cost for each alternative with the alternatives ranked by level of permanence. Detailed cost estimates are provided in Appendix L. The largest cost elements are associated with cleanup of the NW Developed Zone, the levee, and the railyard. Cleanup of the other three zones combined contribute on the order of 15 percent or less of total costs. The total project costs range from less than \$10 million to over \$40 million. The estimated total costs for the alternatives include only the least cost approach where multiple technologies may be applied. This usually means that the cost of excavation is included in the alternative cost rather than alternative approaches such as ozone sparging or flushing.

**Figure 8-2 Remedial Alternative Costs**

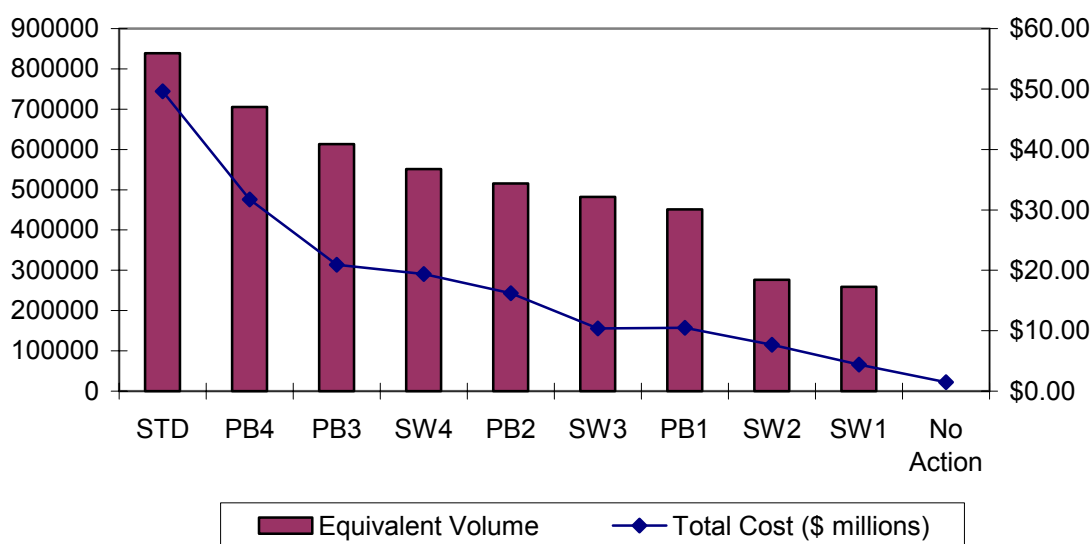
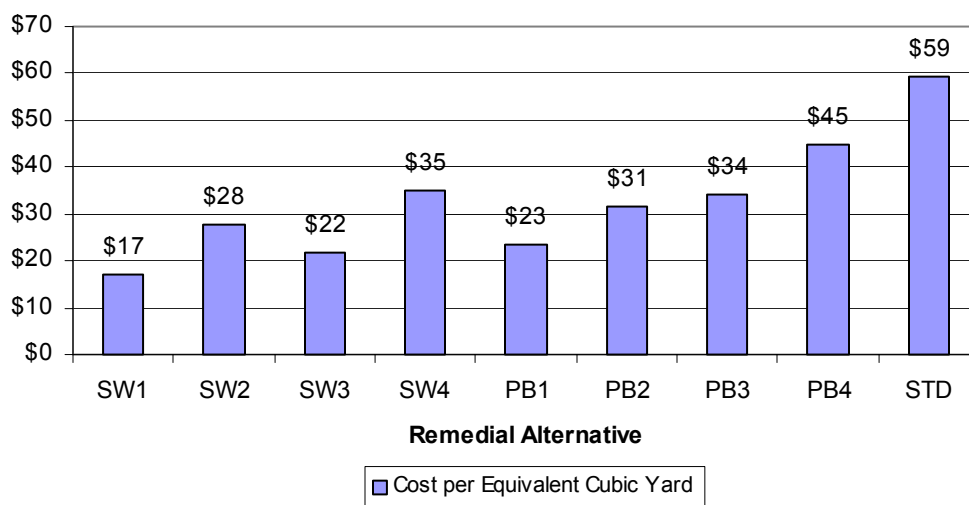


Figure 8-3 illustrates the cost to achieve the increasing levels of permanence. Lower unit costs (total cost divided by total equivalent soil volume) indicate increased cost-effectiveness of the remedial alternative with respect to equivalent soil volume removal or treatment where equivalent soil removal volumes are used as a surrogate for contaminant mass removal and permanence.

**Figure 8-3 Unit Equivalent Soil Removal Cost**



## 8.2.4 Effectiveness Over the Long-Term

Long-term effectiveness includes “the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on-site at concentrations above cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes.” MTCA suggests the use of the use of the following hierarchy of cleanup action components in descending order of long-term effectiveness:

- 1) Reuse or recycling
- 2) Destruction or detoxification
- 3) Immobilization or solidification
- 4) On- or off-site disposal
- 5) On-site isolation or containment
- 6) Institutional controls.

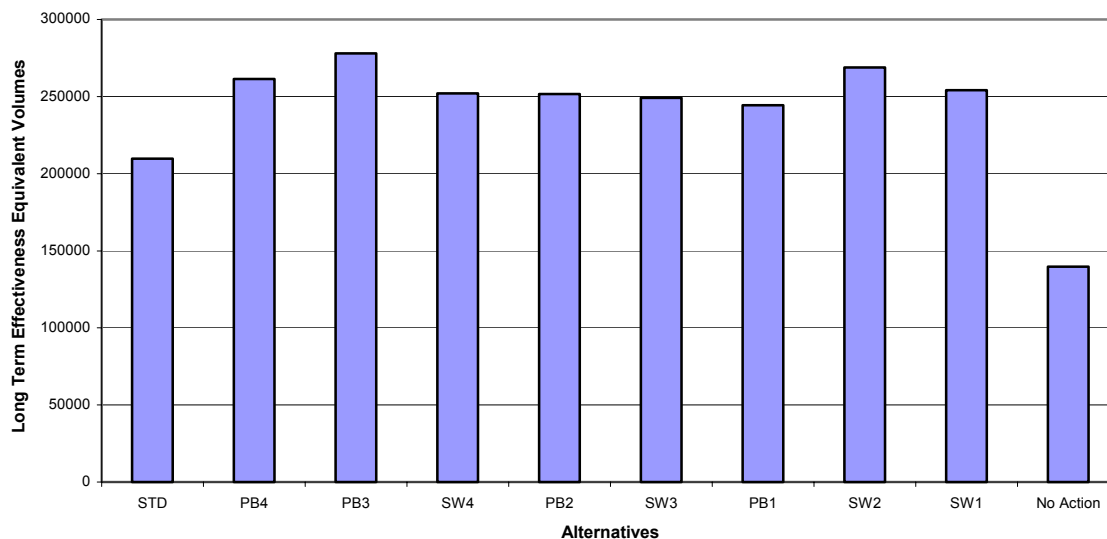
The remedial technologies in the proposed remedial alternatives fit this hierarchy as follows:

Reuse or recycling (free product skimming or trenches and free product flushing with free product recovery and recycling)

- 1) Destruction or detoxification (natural attenuation, enhanced bioremediation, and ozone sparging)
- 2) Immobilization or solidification (pressure grouting)
- 3) Excavation (requires off-site disposal)
- 4) Institutional controls.

Based on the suggestion in MTCA, equivalent soil volumes were calculated for each cleanup action component for each alternative (see Appendix K). The volumes were then divided by the hierarchy number and summed for each alternative to derive a normalized equivalent soil volume. The higher normalized equivalent soil volume suggests a higher level of long-term effectiveness. All of the alternatives have similar long-term effectiveness (see Figure 8-4), although PB4 rates low due to significant excavation and off-site disposal and the No Action alternative rates low due to reliance on institutional controls as the primary remedial technology.

**Figure 8-4: Long Term Effectiveness Equivalent Volumes By Alternative Sorted By Permanence**



## **8.2.5 Management of Short-Term Risks**

Impacts from remedial action implementation include vehicle traffic, temporary relocation of residences/structures, odor, open excavations, and noise, dust and safety concerns associated with extensive heavy equipment activity. The greatest short-term risk to human health is related to safety and general construction activity. As a result, the short-term risks to human health would be greatest for the more permanent alternatives. In all cases, similar measures would be taken to manage risk such as fencing, signage, dust controls, and traffic control.

With respect to short-term risks to the environment, more aggressive remedies in the aquatic resource zones present a greater short-term risk to the environment. So, similar to human health risks, the short-term risks to the environment would be greatest for the more permanent alternatives. In all cases, similar measures would be taken to manage risk such as temporary dams to prevent surface water discharges, angle boring to minimize drilling in sensitive areas, and scheduling work to avoid sensitive species during critical stages.

## **8.2.6 Technical and Administrative Implementability**

Three major administrative concerns with the remedial alternatives are institutional controls, permitting, and relocating residents, businesses, transportation facilities and public facilities such as the school. All SW and PB alternatives require long-term institutional controls on off-railyard properties where soil and/or groundwater will remain above cleanup levels for extended periods of time. Alternatives SW3, SW4, PB2, PB3, PB4 and STD will treat soil and groundwater to cleanup levels in a shorter timeframe in the NE Developed Zone. Alternatives SW4, PB1, PB2, PB3, PB4, and STD will achieve cleanup levels in the South Developed Zone. Alternatives SW4, PB2, PB3, PB4, and STD will achieve groundwater cleanup levels in the NW Developed Zone. Alternative PB4 will substantially reduce the number of properties with soil above cleanup levels while only alternative STD will result in no properties with soil above cleanup levels in the shortest period of time. The administrative implementability of these alternatives would be proportionate to the number of properties requiring some form of institutional control and the length of time these controls must be enforced.

The second administrative implementability issues relates to permitting and mitigating cleanup actions at the Levee and the former Maloney Creek channel. Permits are required from the US Army Corps of Engineers under Section 404 of the Clean Water Act, and the Endangered Species Act requires the Corps to consult with NOAA-Fisheries and the U.S. Fish and Wildlife Service. In addition, incidental take permits may be required under the Endangered Species Act. Permitting of environmental cleanup activities

under this process is expected to take 1 to 2 years. Natural attenuation in the former Maloney Creek channel and enhanced bioremediation or ozone sparging in the Levee would not involve these administrative requirements (as well as the adverse environmental impacts associated with excavating in wetlands and streams). All other approaches would likely require this permit. In addition, any invasive work on or in the Levee will require coordination with King County to ensure the structural integrity of the Levee is not compromised. This applies to all remedial alternatives affecting the Levee.

Finally, the more aggressive remedies (PB4 and STD) necessarily involve administrative and technical challenges associated with extensive excavation around and under buildings and facilities such as the school, the community center, residences, businesses, the main rail line, streets and utilities. Alternative facilities would be required for students, faculty and staff. Temporary dwellings would be required for residents. Businesses and the community center would have to close or relocate to other buildings that may be available in town. Rail traffic (24 trains/day) might have to be rerouted or temporary alternative routes would have to be constructed through town. Even for some of the less aggressive alternatives (such as SW2, SW3 and PB1) if technologies such as natural attenuation, free product recovery and sparging in the NW Developed Zone prove ineffective, then excavation may be needed near or beneath structures. In general, however, technical and administrative implementability decreases with increasing permanence.

## **8.2.7 Consideration of Public Concerns**

The public comment process includes review of this FS/EIS. With respect to MTCA, specific comments regarding whether the proposed alternatives use permanent solutions to the maximum extent practicable are welcome and will be used to select a final cleanup action.

## **8.2.8 Permanence to the Maximum Extent Summary**

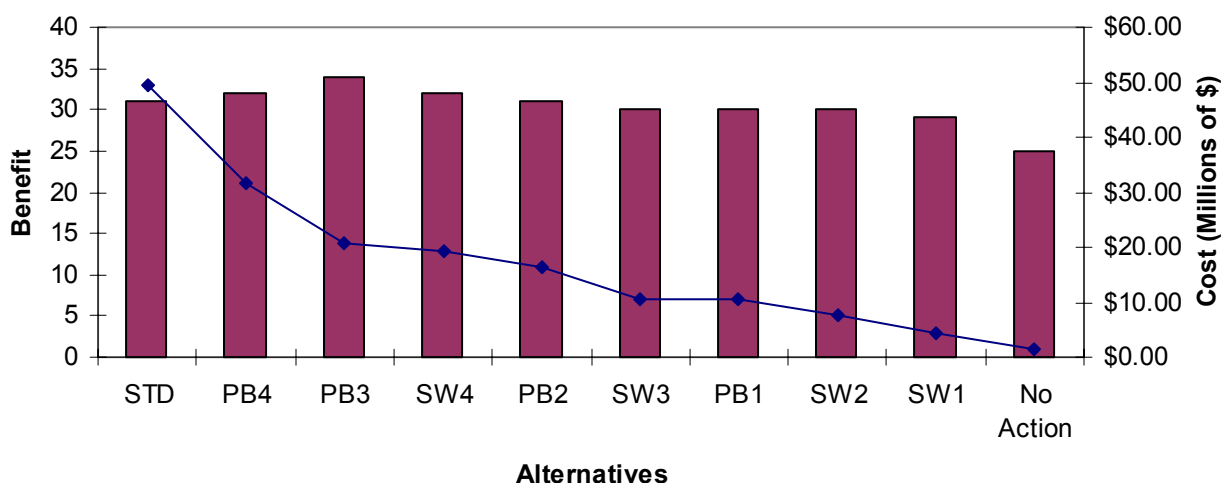
As noted at the beginning of this section, the analysis of whether an alternative is permanent to the maximum extent practicable involves the comparison of the alternatives based on the seven evaluation criteria as described above. The goal is to determine whether the incremental cost of an alternative is disproportionate to the incremental benefit relative to the lower cost alternative (WAC 173-340-360(e)(i)). A systematic approach was developed to quantify the relative benefit of the alternatives. The total benefit of each alternative was calculated as the sum of ratings for five of the evaluation criteria:

- 1) Protectiveness
- 2) Permanence
- 3) Effectiveness over the long-term

- 4) Management of short-term risks
- 5) Technical and administrative feasibility.

Consideration of public concerns will be based on the public comment received on the FS/EIS and cost is part of the analysis to determine if the incremental cost of an alternative is disproportionate to the incremental benefit relative to the lower cost alternative. The benefit ratings are provided in Table 8-1 and Figure 8-5 illustrates these benefit ratings and alternative costs.

**Figure 8-5: Benefit and Cost By Remedial Alternative Ranked By Permanence**



To further evaluate the ratings, benefit was plotted versus cost in Figure 8-6. Where a tangent to this curve is steeper (closer to vertical) indicates a greater incremental benefit per incremental dollar expended. Another representation of this analysis is presented in Figure 8-7 where the column height represents the measure of incremental benefit per incremental cost compared to the next lowest cost alternative where the alternatives are presented from least cost to highest cost (left to right). A shorter column or a negative result represents a more disproportionate incremental cost relative to the incremental benefit.

Figure 8-6: Benefit vs. Cost

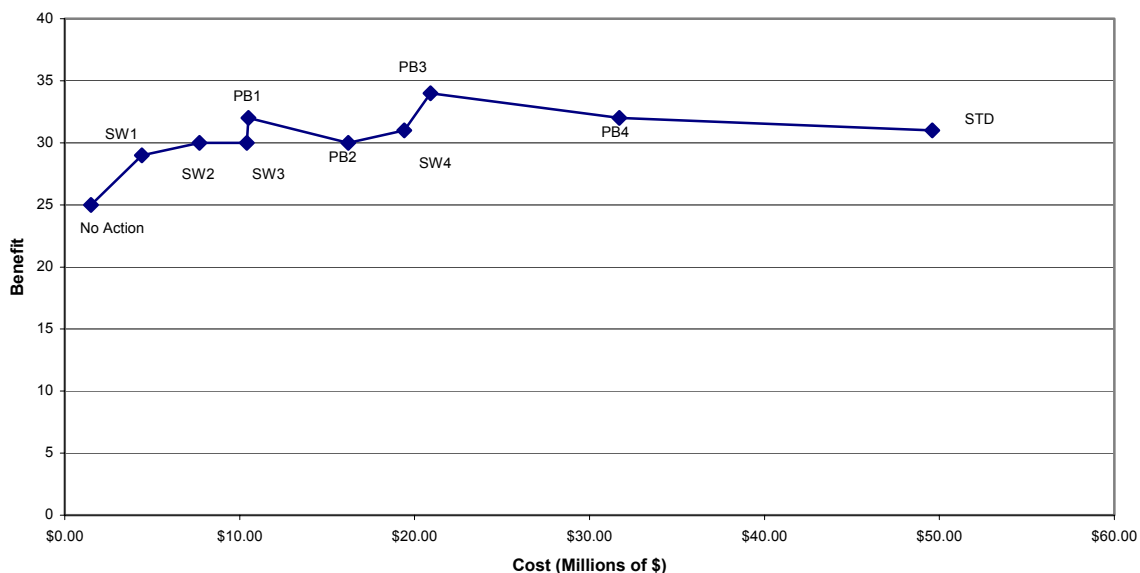
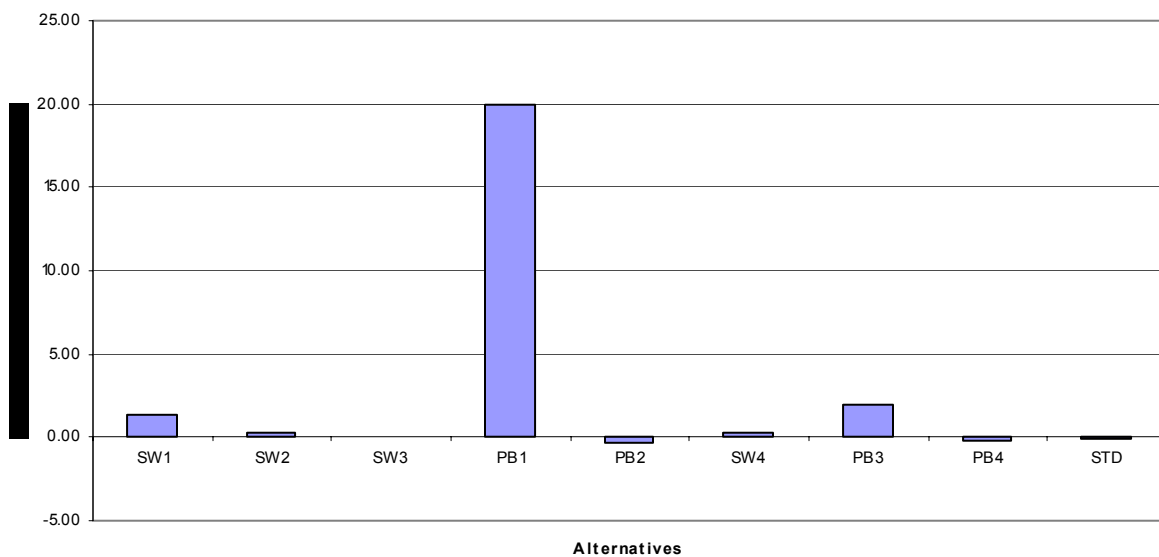


Figure 8-7: Incremental Benefit/Incremental Cost By Remedial Alternative Ranked By Cost



MTCA also states that the most practicable permanent alternative shall be the “baseline cleanup action” against which other alternatives are compared (WAC 173-340-360(e)(ii)(B)). To evaluate the alternatives using this

criterion, the data was further evaluated using two approaches. In the first approach, alternative STD was considered the most practicable permanent alternative and the other alternatives were plotted based on the percentage incremental benefit and percentage decrease in cost versus STD (Figure 8-8). This analysis indicates that PB3 is permanent to the maximum extent practicable. In the second approach, PB3 was considered the most practicable permanent alternative since it had the highest benefit rating. Figure 8-9 illustrates the percentage incremental benefit and percentage decrease in cost of each alternative versus PB3. This analysis indicates that either alternative PB1 or SW1 is permanent to the maximum extent practicable.

Figure 8-8: Incremental Benefit versus Cost Savings Relative to STD

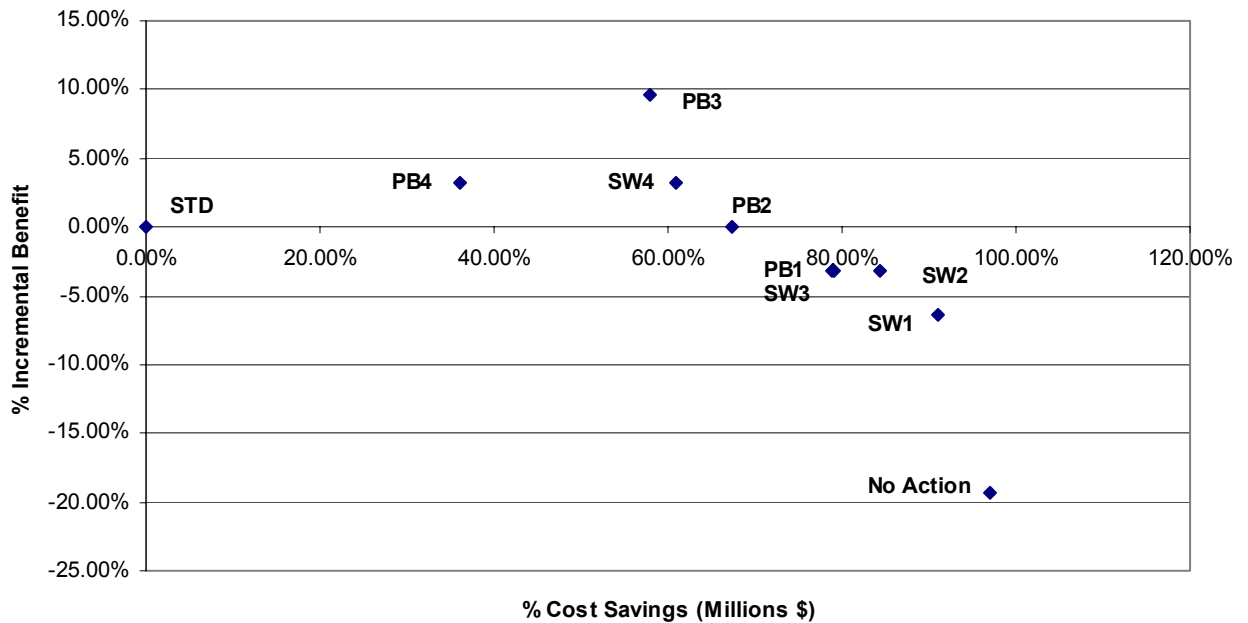
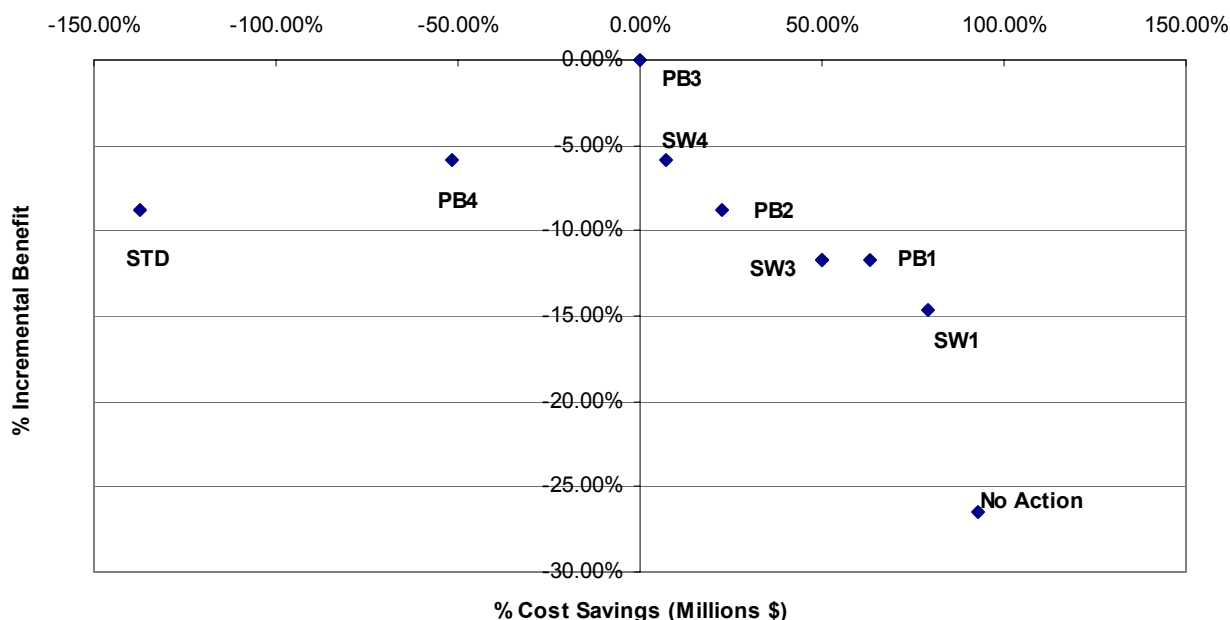


Figure 8-9: Incremental Benefit versus Cost Savings Relative to PB3



### 8.3 Provide for a Reasonable Restoration Timeframe

The second of three “other requirements” for selection of cleanup actions under MTCA is a reasonable restoration timeframe. Restoration timeframe is the time it takes to meet cleanup standards; i.e., to meet all cleanup levels in all media at all points of compliance. A cleanup action can meet cleanup standards through the use of treatment, removal or containment, or some combination of these three approaches. Each alternative relies on removal of free product and restoring groundwater before it discharges to surface water. The PB alternatives rely on containment and institutional controls for soil in off-railyard areas while the SW alternatives rely on containment and institutional controls for both soil and groundwater in off-railyard areas.

Estimates of time to remove free product and restoration timeframes for groundwater and soil were generated for each zone and remedial alternative. These estimates are based on excavation where there is a choice between remedial technologies and they assume that containment and institutional controls can be established for off-railyard areas for soil and groundwater for the SW alternatives and for soil for the PB alternatives. Figures 8-10 through 8-12 illustrate the estimated restoration timeframes. These charts present the mid-point from estimated ranges in Table 7-2, as follows:

- “4 years” represents a 3 to 5 year range
- “8 years” represents a 5 to 10 year range
- “15 years” represents a 10 to 20 year range
- “25 years” represents a 20 to 30 year range
- “40 years” represents greater than 30 years

**Figure 8-10 Free Product Removal Timeframe**

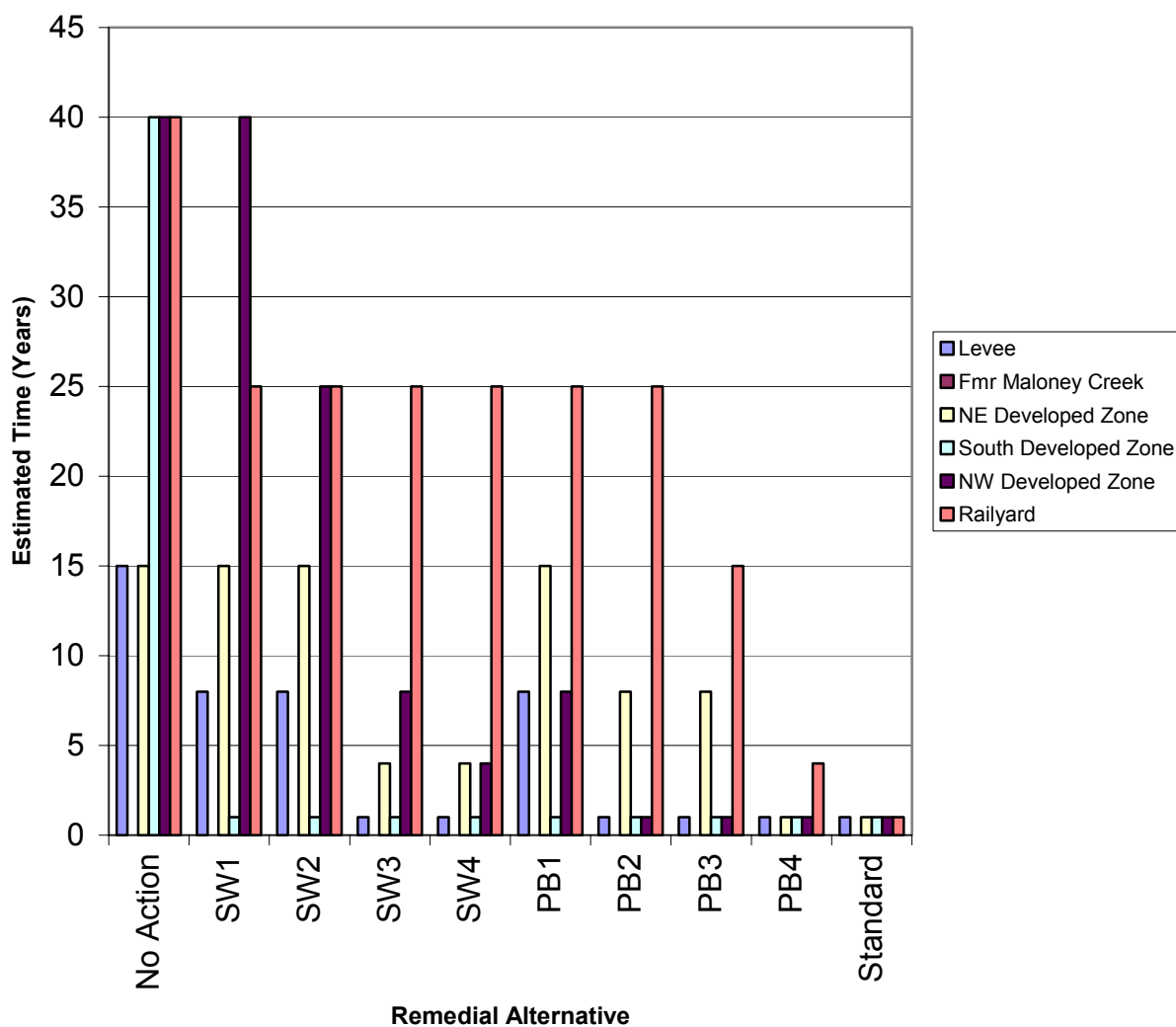


Figure 8-11 Groundwater Restoration Timeframe

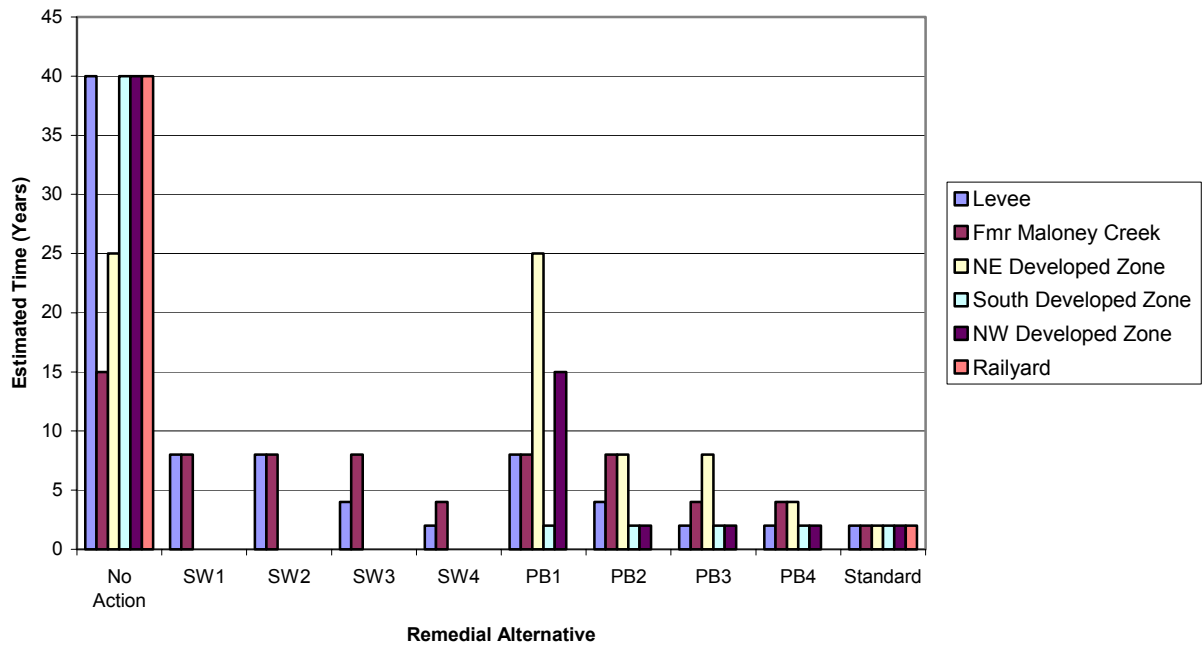
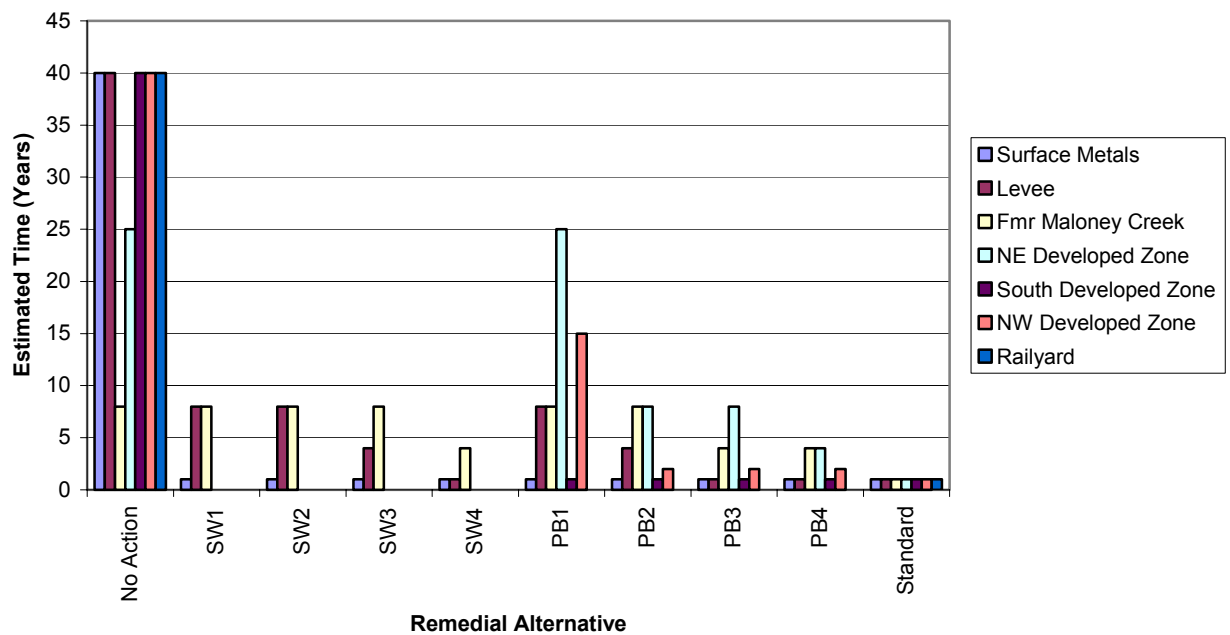


Figure 8-12 Soil Restoration Timeframe



The procedure for determining whether a cleanup action provides for a reasonable restoration timeframe is provided in WAC 173-340-360(4). The nine factors used to determine whether a cleanup action provides for a reasonable restoration timeframe are provided in the rule and include:

- 1) Potential risks posed by the site to human health and the environment
- 2) Practicability of achieving a shorter restoration timeframe
- 3) Current use of the site, surrounding areas, and associated resources that are, or may be, affected by releases from the site
- 4) Potential future use of the site, surrounding areas, and associated resources that are, or may be, affected by releases from the site
- 5) Availability of alternative water supplies
- 6) Likely effectiveness and reliability of institutional controls
- 7) Ability to control and monitor migration of substances from the site
- 8) Toxicity of hazardous substances at the site
- 9) Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the site or under similar conditions.

The rule (WAC 173-340-360(4)(c)) also states that: “a longer period of time may be used for the restoration timeframe for a site to achieve cleanup levels at the point of compliance if the cleanup action selected has a greater degree of long-term effectiveness than on-site or off-site disposal, isolation, or containment options”.

Figure 8-10 indicates that free product will be removed from all off-railyard areas within 10 years for alternatives SW3, SW4, PB2, PB3, PB4, and STD. Free product is removed within 30 years from the railyard for alternatives SW3, SW4, and PB2. PB3 decreases this timeframe to less than 20 years while alternatives PB4 and STD reduce this timeframe to less than 5 years.

Figures 8-11 and 8-12 indicate that all alternatives achieve cleanup standards for soil and groundwater within 10 years, except for PB1. Alternatives SW4, PB4, and STD achieve cleanup standards within 5 years. However, alternatives SW1, SW2, SW3, PB2, and PB3 exceed the 5 years because they rely on destruction or detoxification technologies that provide a greater degree of long-term effectiveness, such as natural attenuation and enhanced

bioremediation. The technologies are applied in the Levee, the Former Maloney Creek Channel, and the NE Developed Zone.

## **8.4 Consider Public Concerns**

The third of the three “Other requirements” in MTCA is to consider public concerns. The public comment process includes review of this FS/EIS. With respect to MTCA, specific comments regarding whether the proposed alternatives provide for a reasonable restoration timeframe are welcome and will be considered prior to selecting a final cleanup action.

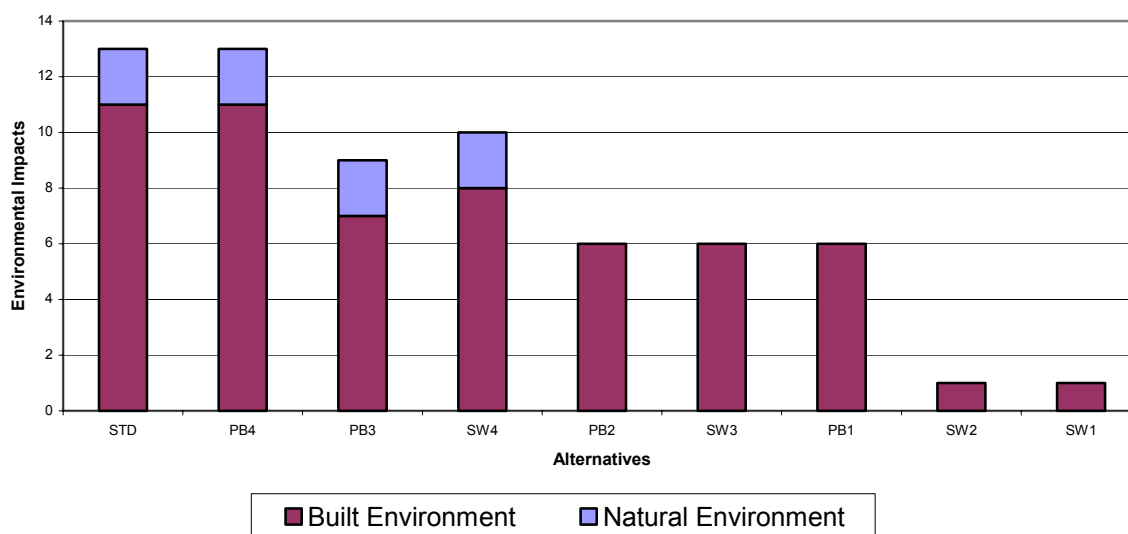
## **8.5 SEPA Analysis**

An EIS is generally required when one or more of the alternatives in the FS will have probable, significant, adverse environmental impacts. The EIS analyzes the probable significant adverse environmental impacts of each reasonable alternative to clean up the site consistent with MTCA and the reasonable measures that could reduce or mitigate those impacts (WAC 197-11-400). These impacts include short- and long-term impacts, direct and indirect impacts and cumulative impacts.

The EIS process is used to analyze alternatives and possible mitigation measures to reduce the environmental impacts of the proposal. Table 7-5 summarized the significant unavoidable impacts of the cleanup alternatives in spite of efforts to mitigate for these impacts. The number of these impacts generally increases as the remedial alternatives become more permanent.

A rating scheme was developed to help evaluate the relative impacts. Where an impact was noted in Table 7-5, it was scored a ‘1’ if it was a moderate impact as noted on Table 7-4 or a ‘2’ if it was a major impact as noted on Table 7-4. Figure 8-13 illustrates the result of this analysis where the alternatives are listed from left to right in order of permanence. As expected, the more permanent alternatives result in more impact except that SW4 has more impact than PB3. The purpose of this figure is to provide a guide in comparing environmental impacts of the remedial alternatives. Impacts to the natural environment vary from a score of ‘0’ for alternatives SW1, SW2, SW3, PB1, and PB2 to a score of ‘2’ for alternatives SW4, PB3, PB4, and STD. Impacts to the built environment score ‘1’ for alternatives SW1 and SW2 to ‘11’ for alternatives PB4 and STD. Alternatives SW3, SW4, PB1, PB2, and PB3 have moderate impacts to the built environment of between ‘6’ and ‘8’. Any comparison using this chart is only relevant if the alternatives are permanent to the maximum extent practicable, provide for a reasonable restoration timeframe, and consider public concerns.

Figure 8-13 Environmental Impacts By Remedial Alternatives Ranked By Permanence



## 8.6 Preferred Alternative Selection

Ecology will choose the cleanup action based on an analysis similar to that presented in this Section 8. The selected cleanup alternative must:

- Satisfy MTCA threshold requirements (Section 8.1)
- Be permanent to the maximum extent practicable (Section 8.2)
- Provide for a reasonable restoration timeframe (Section 8.3)
- Consider public concerns (Section 8.4)
- Minimize environmental impacts through alternative selection and mitigation (Section 8.5)

The selected cleanup alternative may or may not be one of the remedial alternatives presented in this FS/EIS. It may combine cleanup actions by zone in a manner that better satisfies MTCA and SEPA requirements or it may use technologies that were retained (Appendix J) but not included in any of the remedial alternatives. For example, a final cleanup action based on SW3 might also include free product and soil excavation in the Levee Zone rather than just free product removal or grouting. As another example, a final cleanup action based on PB2 might include permeation grouting to solidify free product under buildings in the NW Developed Zone rather than excavation or flushing.